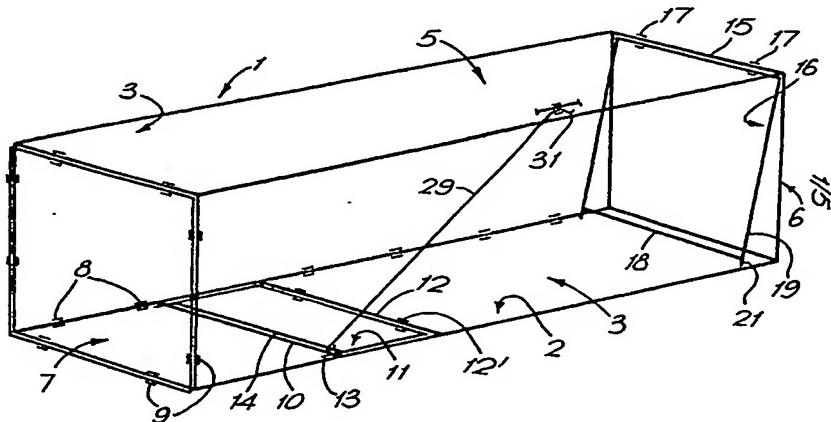




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(54) Title: ANIMAL TRAP



## (57) Abstract

An animal trap comprises a tunnel-shaped body (1) having a floor (2), two side walls (3, 4), a top (5), an open end (6) and a closed end (7), a treadle (11) pivotally connected to the floor (2) at an open-end part of the treadle (11) for movement between a set position in which it is angled up from the floor (2) and a trip position in which it is at least less steeply angled with respect to the floor (2), a door (16) pivotally connected at a top edge thereof to the top (5) of the body (1) at or close to the open end (6) for downwards swinging movement from a set position extending beneath at least part of the top (5) of the body (1) and a trip position in which it closes the open end (6) of the body (1), a trip rod (29) having one end pivotally connected to the treadle (11) at a position spaced towards the closed-end (7) of the body (1) from the treadle's, pivoted, open-end part and another end slidably connected to the top (5) of the body (1), and a hook (31) integral with the other end of the trip rod (29) engageable with the door (16) to hold it in its set position and disengageable for downwards swinging of the door (16) on movement of the treadle (11) to its trip position, following treading thereon by an animal, and concomitant movement of the trip rod's other end and its hook (31) from the open end (6) of the body (1) and a previously engaged part of the door (16).

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### ANIMAL TRAP

#### Background of the Invention

The present invention relates to an animal trap.

5 There is a continuing requirement for animal traps for instance for catching vermin such as squirrels and rabbits. The latter are an increasing problem since they are developing immunity to myxomatosis.

A known type of trap includes a tunnel-like body with a  
10 door closing on tripping by an animal which has entered the trap. Some, such as described in British patent specification No. 1400301 employ doors which slide vertically downwards to close. These require careful guidance. Others such as described in British patent specification No. 2116817, which  
15 has two doors, involve complex mechanisms.

A problem with a trap for relatively long animals is that a treadle for the animal to tread on and trip the trap must be sufficiently far from the door that in closing the door it clears the longest animal of the species to be  
20 caught.

#### The Invention

The trap of the invention has been invented during a programme to develop a trap for relatively long animals  
25 which is at the same time simple, robust and reliable.

An animal trap of the invention comprises:-

a tunnel-shaped body having an open end and a closed end,

30 a treadle pivotally connected at a lower part of the body for pivotal movement from a set position to a trip position on treading on it by an animal,

35 a door pivotally connected at an upper part of the body in the region of the open end for pivotal, downwards-swinging movement from a set position (leaving the trap open) to a trip position closing the open end of the body,

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and,

a trip rod pivotally connected or connectible at one end to the treadle and slidably connected at the other end to the body close to the door's set position for holding  
5 the door in its set position and releasing the door on movement of the trip rod to its trip position with treading on the treadle by the animal for downwards swinging of the door to close the trap.

In the preferred embodiment described below, the animal  
10 trap comprises:-

a tunnel-shaped body having a floor, two side walls, a top, an open end and a closed end,

a treadle pivotally connected to the floor at an open-end part of the treadle for movement between a set  
15 position in which it is angled up from the floor and a trip position in which it is at least less steeply angled with respect to the floor,

a door pivotally connected at a top edge thereof to the top of the body at or close to the open end for  
20 downwards swinging movement from a set position extending beneath at least part of the top of the body and a trip position in which it closes the open end of the body, and

a trip rod having one end pivotally connected to the treadle at a position spaced towards the closed end of  
25 the body from the treadle's, pivoted, open-end part and another end slidably connected or connectible to the top of the body to hold it in its set position and disengageable for downwards swinging of the door on movement of the treadle to its trip position, following treading thereon by  
30 an animal, and concomitant movement of the trip rod's other end and its hook from the open end of the body and a previously engaged part of the door.

This arrangement enables the trip rod to have a relatively steep inclination from its one end pivotally connected to a  
35 closed-end part of the treadle, preferably at its edge

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closest to the closed end of the body, to its other end  
slidably connected to the top of the body; whereby pivotal  
rotation of the treadle about its open-end part, preferably  
at its edge closest to the open end of the body, causes an  
5 appreciable concomitant translational movement of the trip  
rod's other end for release of the door, with negligible  
rotational movement of the trip rod such as might interfere  
with the sliding connection of the trip rod to the trip rod  
to the body.

10 In one alternative, the other end of the trip rod is  
free, whereby it can be engaged under an element of the door  
and over an element of the body for holding the door in its  
set position, movement of the treadle disengaging the rods  
from the body element for releasing of the door. In  
15 another alternative, the trap includes a hook secured to the  
other end of the trip rod for holding the door in its set  
position and releasing the door on movement of the trip rod  
to its trip position.

Whilst provision of a floor is convenient, for strength-  
20 ening the body and providing an enclosure around a trapped  
animal if the trap is lifted, the floor can be dispensed  
with where the trap remains permanently on the ground, with  
the latter closing the bottom of the trap. The floor may  
have a cut-out below the treadle for the treadle to move  
25 down into. Alternatively the treadle can be mounted for  
pivotal movement down onto the floor on tripping.

Conveniently the hook is an integral part of the trip  
rod which is bent into a hook shape, although it is possible  
for a separate hook to be provided. Similarly, the said  
30 other or hook end of the trip rod can be slidably connected  
to the body by a separate connecting member or by a bent  
part of itself.

To ensure that the door cannot be opened by the trapped  
animal, the door is preferably provided with fingers engage-  
35 able with the body in the closed position of the door for

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preventing unintentional opening of the door.

To help understanding of the invention and to illustrate other characteristics and advantages thereof, a specific embodiment will now be described by way of example and with 5 reference to the accompanying drawings.

The Drawings

Figure 1 is a diagrammatic perspective view of an animal trap of the invention;

10 Figure 2 is a side view of the trap of Figure 1 in its set position;

Figure 3 is a view similar to Figure 2 of the trap in its trip position;

15 Figure 4 is a scrap side view of the trap's treadle in its set position;

Figure 5 is a scrap side view of the trap's door-supporting hook in its set position;

Figure 6 is a scrap side view of the bottom of the trap's door in its trip position;

20 Figure 7 is a plan view of the trap broken away to show the door in its set position;

Figure 8 is a view similar to Figure 7 broken away to show the door and the treadle in their trip position;

25 Figure 9 is a view similar to Figure 2 showing a variant;

Figure 10 is a view similar to Figure 3 showing the variant; and

Figure 11 is a view similar to Figure 2 showing another variant.

30

Specific Embodiment

Referring first to Figures 1 to 8, the trap there illustrated has a tunnel-shaped body 1 which is of 25mm x 25mm galvanised Weldmesh (Registered Trade Mark) welded mesh 35 of steel rod. The body has a floor 2, two side walls 3,4,

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a top 5, an open end 6 and a closed end 7. The floor 2, side walls 3,4 and top 5 are all equal size panels having a length of 36 pitches and a width of 10 pitches of the mesh, that is a length of approximately 900mm and a width of  
5 250mm. Each of these panels is integrally connected to its neighbour by having been bent from a flat sheet of the mesh, except along the floor 2 side wall 4 edge corner where the free edges of the original mesh sheet are joined by crimped ferrules 8. The closed end is a 10 pitch x 10 pitch,  
10 i.e. 250mm x 250mm mesh sheet connected to the closed-end edges of the main body panels 2,3,4,5 by further crimped ferrules 9.

The floor 2 has a full width and five pitch long aperture 10 for a treadle 11. The open-end end 12 of the  
15 aperture is 21 pitches, i.e. 525mm, from the open end 6 of the body 1 and has a treadle 11 pivotally connected to it by further ferrules 12'. The treadle 11 is of 50mm x 25mm mesh having a width of 9 25mm-meshes and a length of 2 50mm-meshes. Two fingers 13 are left in the cropping of the  
20 mesh at the free edge 14 of the treadle. The length of the fingers 13, which are extensions of the edge mesh-rods of the treadle, is such that in the trip position of the treadle they bear on the closed-end edge mesh-rod 33 of the treadle-aperture 10, i.e. the fingers are approximately 10mm  
25 long.

At the open-end edge 15 of the top panel 5, a door 16 of 50mm x 25mm mesh is pivotally connected by further crimped ferrules 17. The door is 9 25mm-meshes wide by 5 50mm-meshes high. This length of the door is such that it  
30 can pivotally swing down from a set position (see Figure 2) extending beneath the top panel 5 to a trip position closing the open end 6 of the body 1. In the trip position, the bottom mesh-rod 18 of the door would without special provision (except possibly slight deflection of the floor) swing out  
35 of the open end 6 failing to close the trap. To provide

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against this, the side edge mesh-rods 19,20 of the door are cropped to leave 10mm fingers 21,22 which engage with the second from the open end transverse mesh-rod 23 of the floor. To prevent these fingers 21,22 engaging the third 5 from the end floor mesh-rod 24, this is cut away at side apertures 25,26 in the floor. The other mesh-rods in the door parallel to its side-edge mesh-rods 19,20 are cropped off at the bottom mesh-rod 18 except for two intermediately placed mesh-rods which are left as 20mm fingers 27,28 bent 10 at 70° to the plane of the door. These fingers 27,28 engage, with slight deflection of the floor, on the open-end side of the floor transverse mesh-rod 24 to temporarily secure the door against opening once the door has swung down to its closed position.

15 To the closed-end edge mesh-rod 14 of the treadle 11 is pivotally connected a trip rod 29 of galvanized wire via an eye 29' formed by bending of the rod 29 around the mesh-rod 14 at one side of the treadle. The trip rod 29 slopes up to the top panel to which it is slidingly connected approximately 20 105mm from the open end of the body by a further crimped ferrule 30. This end of the trip rod is shaped to the form of a hook 31 extending down from the top panel 5 and then towards the open end of the body.

In the set position of the trap, the hook is moved 25 slightly towards the open end 6 to engage with the bottom mesh-rod 18 of the door in the latter's set position extending beneath the top panel 5. This movement of the hook is accompanied by an angling of the treadle 11 up from the floor at approximately 5° into its set position, by movement 30 of the trip rod 29 as a whole towards the open end 6.

Bait for an animal to be trapped is placed on the floor 2 between the treadle 11 and the closed end 7. When the animal enters the trap via the open end 6 to take the bait it treads on the treadle and the hook 31 is withdrawn to 35 free the door to fall to its trip position trapping the

animal. It will be noted that the animal is well within the trap when the door closes. The dimensions given are for a rabbit trap and are such that for most rabbits, the door will swing down clear of the rabbit's tail once it has 5 entered sufficiently far to tread with its fore legs on the treadle. Once the door falls to its set position, its retention there closing the open end of the body is controlled by the fingers 21,22,27,28 as described above.

For control of the treadle 11 during transport of the 10 trap, its closed-end edge mesh-rod 14 is loosely clipped by a bent wire clip 32 to the closed-end edge mesh-rod 33 of the aperture 10. Further, for permanent holding open of the door 16, it is provided with a similar clip 34 which can be engaged as required with one of the mesh-rods of the top 15 panel 5.

#### Variants

The trap may of course be scaled up or down for trapping other sizes of animals. Similarly other pitch of mesh may 20 be used.

In a simplification, the treadle aperture 10 is dispensed with, the treadle lying flat on the floor, which is continuous beneath it, in its trip position. With this arrangement the treadle fingers 13 are not required.

25 The trip rod may be integrally bent for sliding connection with the selected top panel mesh-rod, thereby dispensing with the ferrule 30.

Referring now to Figures 9 and 10, the door 116 there shown is similar to the door 16 except that it has an eight 30 pitch wide by two pitch long floor extension 150 of 25 mm x 25 mm mesh. The extension is pivotally connected by further ferrules 151 to the bottom edge mesh-rod 118 of the door 116. Additionally a torsion spring 152 is provided to maintain the extension 150 at approximately 135° to the door 35 116. In the set position (see Figure 9) the extension

extends up to be engaged by the hook 131. On tripping the hook is withdrawn and the door falls until the extension contacts the floor 102. The door extension has fingers 153 as extensions of three of its mesh-rods. The fingers 153 5 are so angled as to engage a transverse mesh-rod 154 of the floor 102. The momentum of the door on falling or the momentum of the trapped animal attempting to escape carries the fingers 153 over the transverse mesh-rod 154. The spring 152 then urges the fingers to engage below the level 10 of the mesh-rod 154, whereby any attempt to open the door inwards is prevented. Opening outwards is prevented by fingers 121,122 similar to fingers 21,22. The extension 150 inhibits access by the animal to the bottom of the door for opening of it.

15 Referring to Figure 11 there is shown another variant of which the body 201 is of 75mm x 25mm mesh. It has no aperture in the floor 202 below its treadle 211. The free end 260 of its trip rod 229 has no hook as such; its tip 261 merely has a very slight downwards bend. In the set 20 position, the end 260 passes through the door between its bottom edge mesh-rod 218 and the next mesh-rod up 262. The tip 261 is engaged on top of the top transverse mesh-rod 263 nearest above the mesh-rod 262 in the set position of the door 216, by longitudinal movement on lifting of the treadle 25 211. Thus the trip rod 229 is supported and holds up the door 216 by bearing of the latter's mesh-rod 218 on the trip rod 229. Depression of the treadle 211 moves the rod tip 261 out of engagement with the top mesh-rod 263 so that the trip rod 229 falls free as does the door 216. Where the 30 transverse mesh-rods in the door are close together, it may be judicious to locally remove the one such as 262 at the edge of the door to ensure that the tip 261 does not foul it in falling with the door. Where as in this variant 75mm x 25mm mesh is used for the floor 202 the door will close by 35 its fingers 221 coming into contact with open-end mesh-rod 264 of the floor 202.

CLAIMS

1. An animal trap comprising:-  
a tunnel-shaped body (1; 201) having an open end  
5 (6) and a closed end (7),  
a treadle (11; 211) pivotally connected at a lower part (2; 102; 202) of the body (1; 201) for pivotal movement from a set position to a trip position on treading on it by an animal,  
10 a door (16; 116; 216) pivotally connected at an upper part (5) of the body (1; 201) in the region of the open end (6) for pivotal, downwards-swinging movement from a set position (leaving the trap open) to a trip position closing the open end (6) of the body (1; 201), and  
15 a trip rod (29; 229) pivotally connected at one end to the treadle (11; 211) and slidingly connected or connectible at the other end to the body (1; 201) close to the door's set position, for holding the door (16; 116; 216) in its set position and releasing the door (16; 116; 216) on movement of the trip rod (29; 229) to its trip position with treading on the treadle by the animal for downwards swinging of the door (16; 116; 216) to close the trap.
2. An animal trap as claimed in claim 1, wherein the body (1; 201) includes a floor (2; 102; 202) and the treadle (11; 211) is pivotally connected to the floor (2; 102; 202).  
25
3. An animal trap as claimed in claim 2 wherein the floor (2; 102) has a cut-out (10) beneath the treadle (11).  
30
4. An animal trap as claimed in claim 2 or claim 3 wherein the treadle (11; 211) is pivotally connected at one end thereof to the floor (2; 102; 202) at the other end thereof to the trip rod (29; 229).  
35
5. An animal trap as claimed in any preceding claim, wherein the body (1; 201) includes a top (5) and the door (16; 116; 216) is pivotally connected to the top (5) to extend beneath a portion of the top in the set position of

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the door (16; 116; 216).

6. An animal trap as claimed in claim 5, wherein the door (16; 116; 216) is pivotally connected to the top (5) of the body (1; 201) at the open end thereof.

5 7. An animal trap as claimed in claim 1 wherein the other end (260) of the trip rod (229) is free, whereby it can be engaged under an element (218) of the door (216) and over an element (263) of the body (201) for holding the door (216) in its set position, movement of the treadle (211)  
10 disengaging the rod (229) from the body element (263) for releasing of the door (216).

15 8. An animal trap as claimed in any one of claims 1 to 6 including a hook (31; 131) secured to the other end of the trip rod (29) for holding the door (16; 116) in its set position and releasing the door (16; 116) on movement of the trip rod (29) to its trip position.

9. An animal trap as claimed in any preceding claim, wherein the trip rod (29) is bent into a shape to form the hook (31) at its other end.

20 10. An animal trap as claimed in any preceding claim, wherein the other end of the trip rod (29) is slidingly connected to a longitudinal element of the body (1) via a separate clip (30) or an integral bend in the trip rod.

11. An animal trap as claimed in any preceding claim  
25 wherein the treadle (11; 211) is pivotally connected to the body at an open-end edge of the treadle whereby in the set position of the treadle it is angled upwards and in its trip position it is less steeply angled.

12. An animal trap as claimed in claim 11, wherein the trip rod (29; 229) is connected to the treadle (11; 211) at a position spaced towards the closed end (7) of the body (1; 201) from the open-end edge (6) of the treadle (11; 211) whereby on movement of the treadle (11; 211) from its set position to its trip position, the other end of the trip rod (29; 229) is moved away from the open end (6) of the body  
35

(1; 201), and the hook (31; 131) or free other end (260) of the trip rod has a free end extending towards the open end (6) of the body (1; 201) for withdrawal from engagement with an element of the door (16; 116; 216) on such movement of  
5 the treadle (11; 211).

13. An animal trap as claimed in claim 2 or any preceding claim appendant to claim 2 wherein the door (16; 116; 216) has fingers (21,22,27,28; 121,122; 221) engageable with the body in the closed position of the door (16; 116; 10 216) for preventing unintentional opening of the door (16; 116; 216).

14. An animal trap as claimed in claim 2 or in any preceding claim appendant to claim 2, including a flap (15) attached to the door (116) at its bottom edge for lying on  
15 the floor (102) in the trip position of the door (116) to inhibit access of a trapped animal to the bottom edge of the door (116).

15. An animal trap as claimed in any preceding claim, wherein the body (1; 201) is of welded steel rod mesh  
20 jointed by crimped ferrules.

16. An animal trap comprising:-  
a tunnel-shaped body (1; 201) having a floor (2; 102; 202), two side walls (3,4), a top (5), an open end (6) and a closed end (7),

25 a treadle (11; 211) pivotally connected to the floor (2; 102; 202) at an open-end part of the treadle (11; 211) for movement between a set position in which it is angled up from the floor (2; 102; 202) and a trip position in which it is at least less steeply angled with respect to  
30 the floor (2; 102; 202),

a door (16; 116; 216) pivotally connected at a top edge thereof to the top of the body (1; 201) at or close to the open end (6) for downwards swinging movement from a set position extending beneath at least part of the top (5) of  
35 the body (1; 201) and a trip position in which it closes the

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open end (6) of the body (1; 201), and  
a trip rod (29; 229) having one end pivotally  
connected to the treadle (11; 211) at a position spaced  
towards the closed-end (7) of the body (1; 201) from the  
5 treadle's, pivoted, open-end part and another end slidably  
connected or connectible to the top (5) of the body (1; 201)  
to hold it in its set position and disengageable for downwards  
swinging of the door (16; 116; 216) on movement of the  
treadle (11; 211) to its trip position, following treading  
10 thereon by an animal, and concomitant movement of the trip  
rod's other end from the open end (6) of the body (1; 201)  
and a previously engaged part of the door (16; 116; 216).

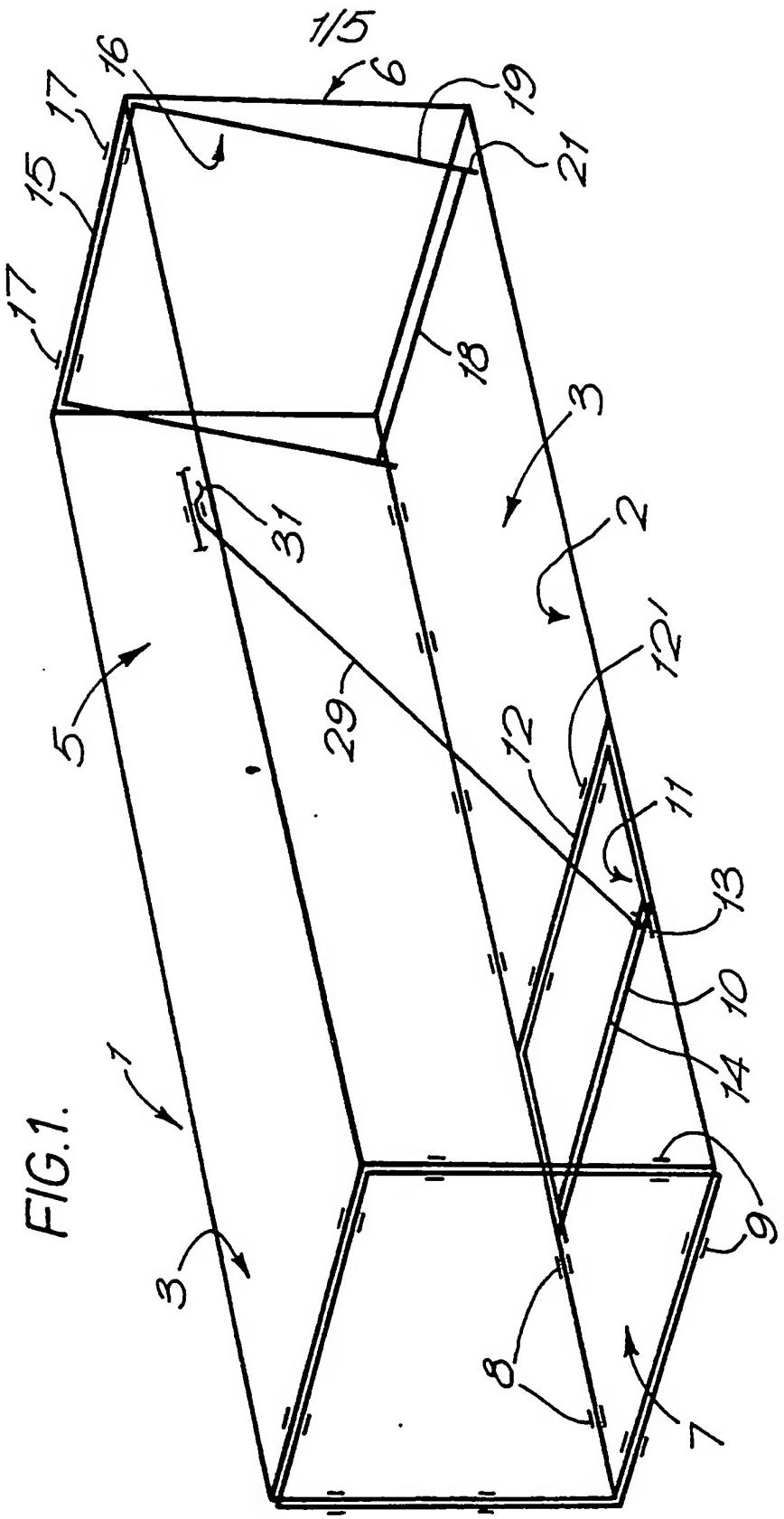
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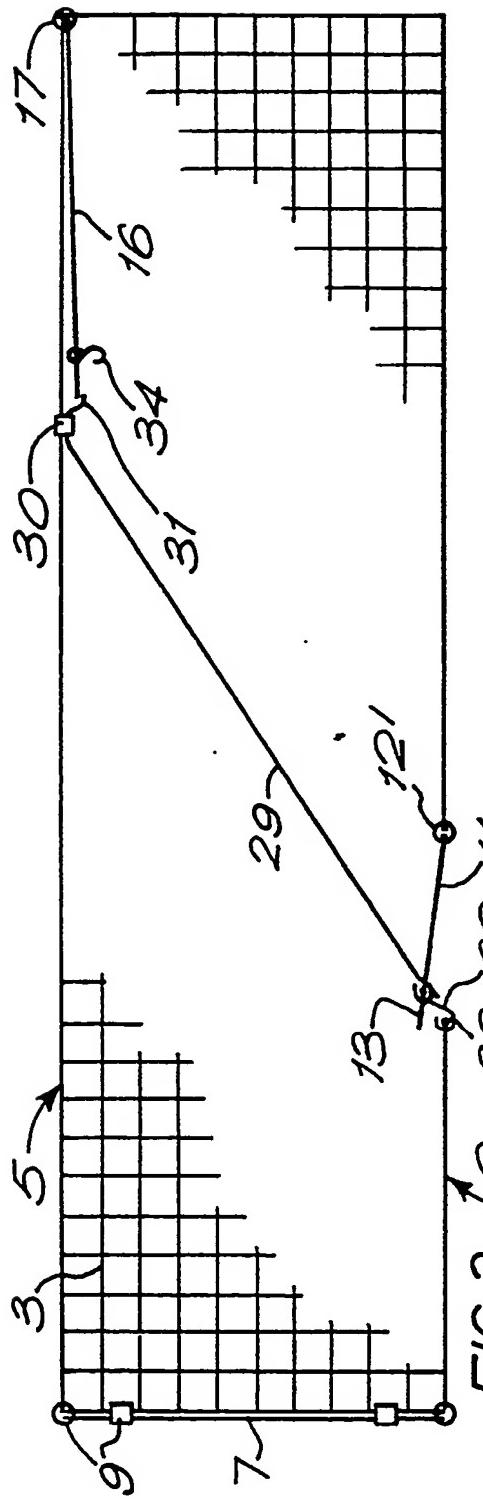


FIG. 2.

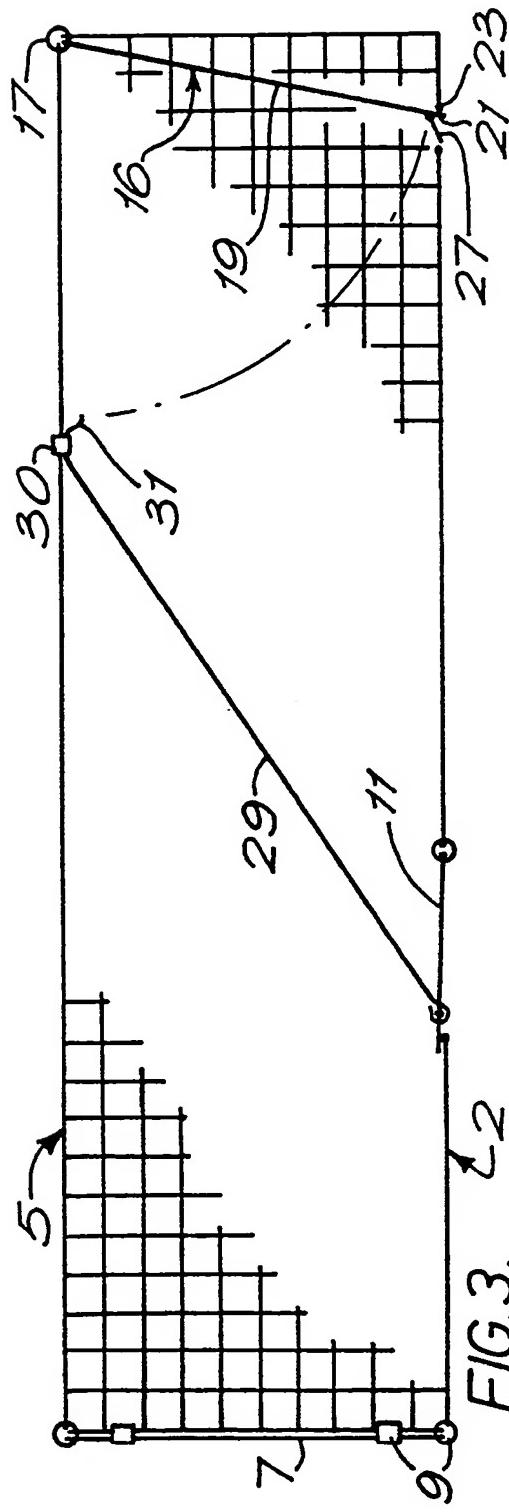


FIG. 3.

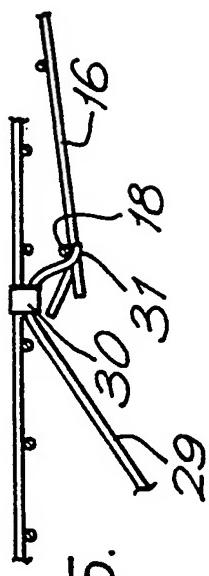


FIG. 5.

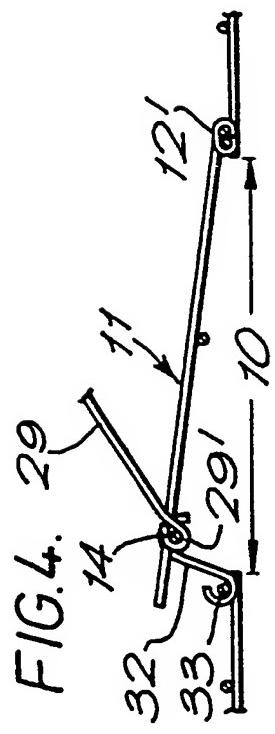


FIG. 4.

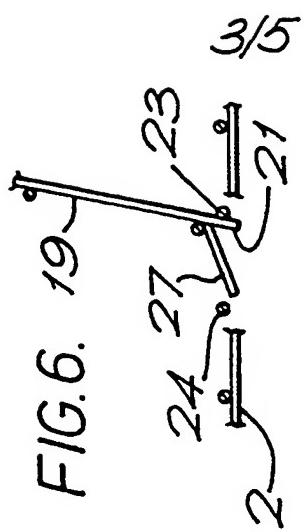


FIG. 6.

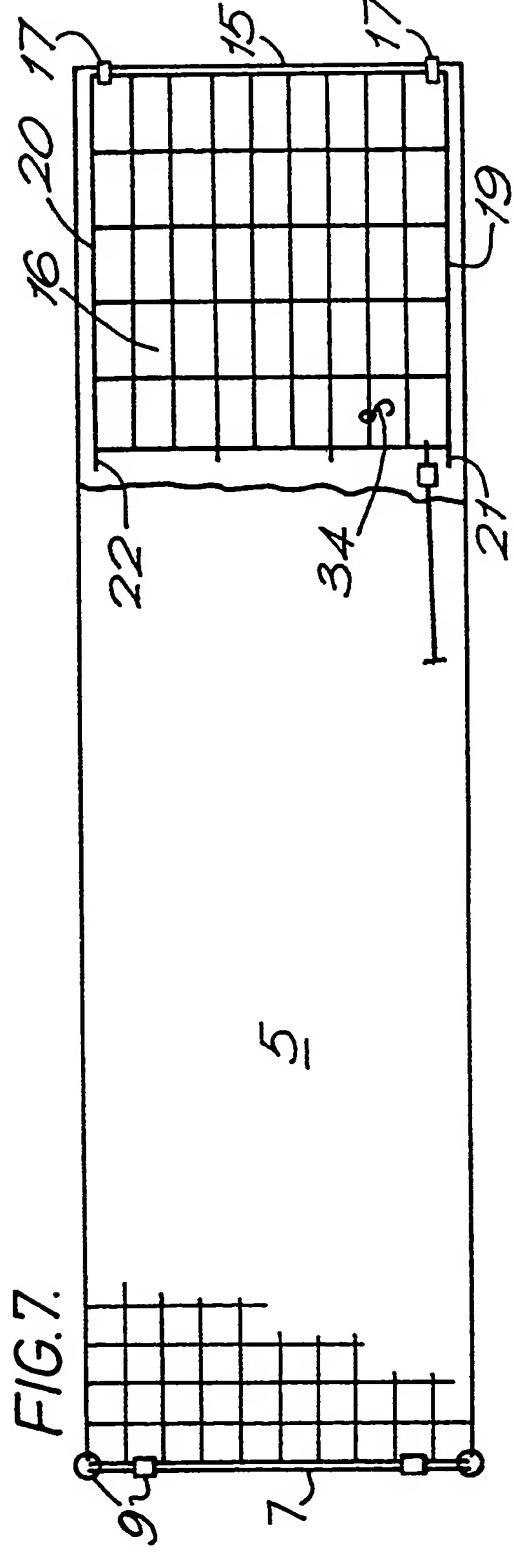
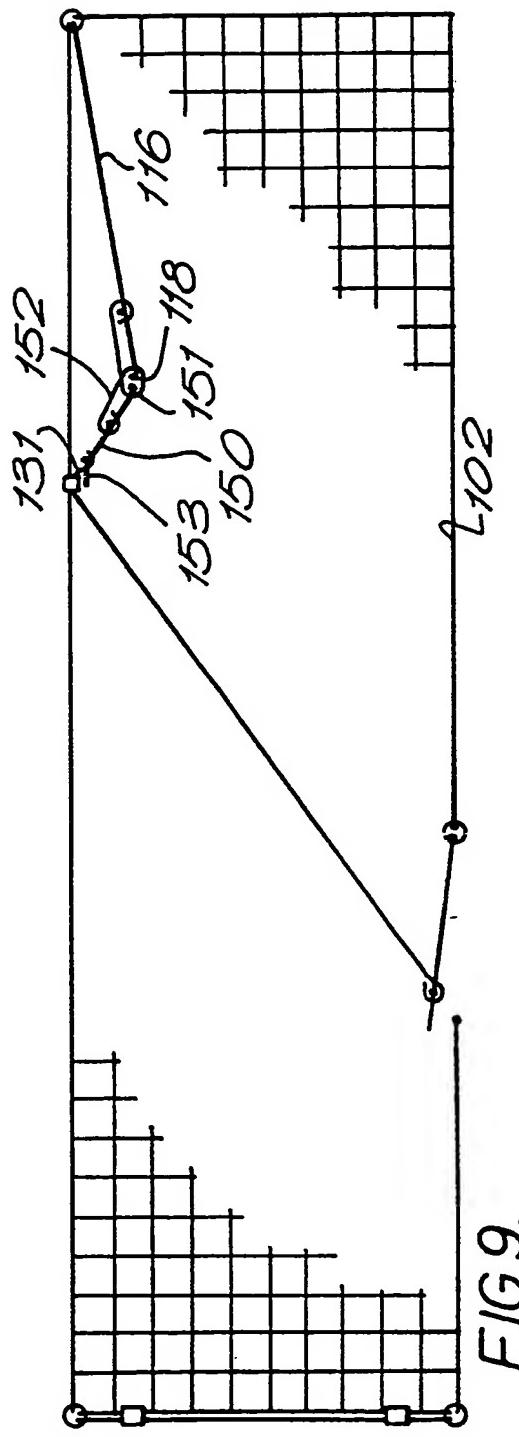
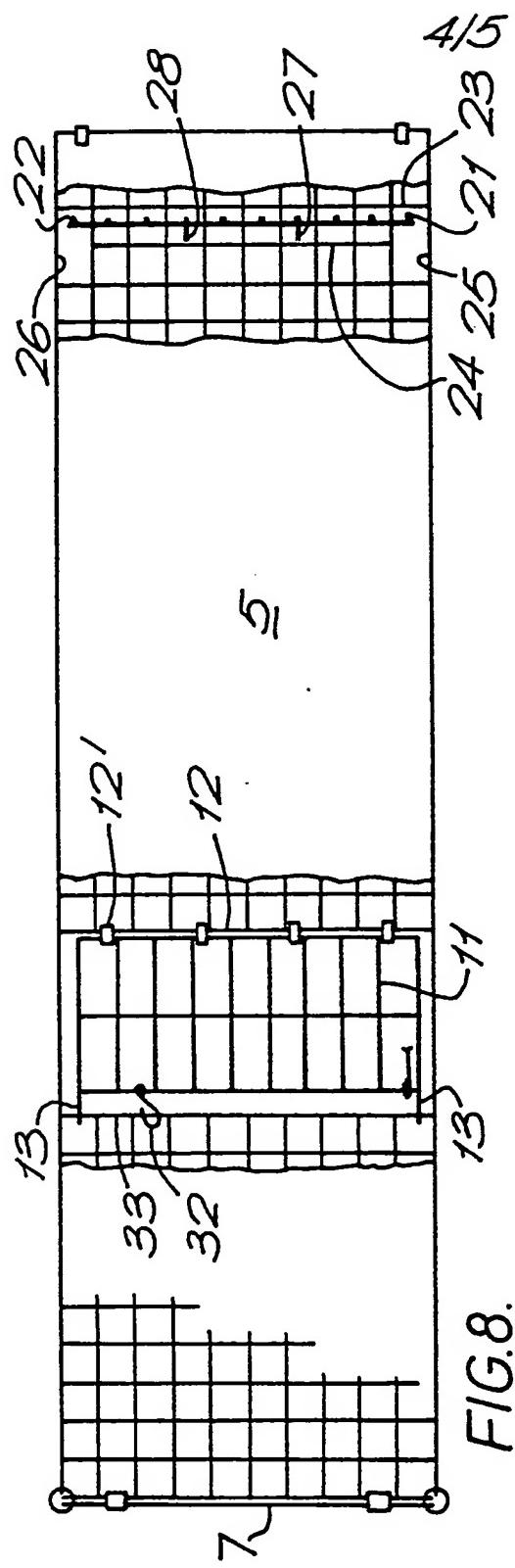
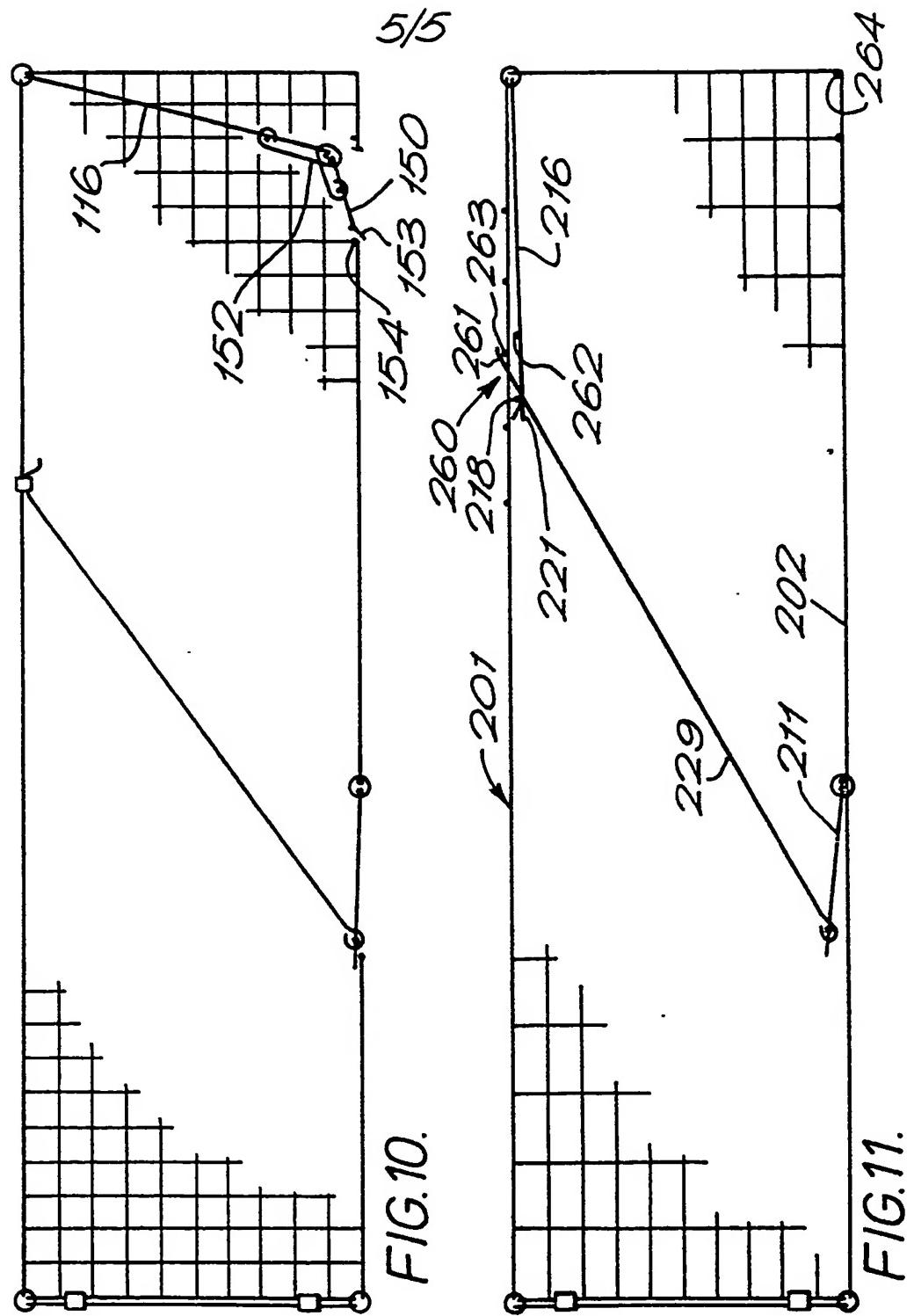


FIG. 7.





# INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 86/00180

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) <sup>1</sup>

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC <sup>4</sup>: A 01 M 23/18

## II. FIELDS SEARCHED

Minimum Documentation Searched <sup>7</sup>

Classification System	Classification Symbols
IPC	A 01 M

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>

## III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>9</sup>

Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	US, A, 3394487 (F.A. WOOD) 30 July 1968, see column 2, line 53 - column 3, line 44; figures 1-6 --	1-2, 4-12, 15-16
X	US, A, 2692453 (G.L. WINGFIELD) 26 October 1954, see column 2, line 34 - column 3, line 14; figures 1-3	1
A	--	5-8, 12, 16
X	US, A, 3624951 (J.W. GILBAUGH) 7 December 1971, see column 2, line 20 - column 3, line 7; figures 1,3-4	1-2, 16
A	--	4-6, 7, 11-12 15
A	GB, A, 2116817 (MASATOSHI MATSUURA) 5 Sep- tember 1983, see page 1, lines 66-119; figures 1-2 --	1, 5-7, 16
A	DE, C, 536590 (G. KUHN) 8 October 1931  -----	

\* Special categories of cited documents: <sup>10</sup>

- "A" document defining the general state of the art which is not considered to be of particular relevance
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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

## IV. CERTIFICATION

Date of the Actual Completion of the International Search

17th June 1986

Date of Mailing of this International Search Report

14 JUIL 1986

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

M. VAN MOL

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

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INTERNATIONAL APPLICATION NO. PCT/GB 86/00180 (SA 12727)

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This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 26/06/86

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 3394487		None	
US-A- 2692453		None	
US-A- 3624951	07/12/71	None	
GB-A- 2116817	05/10/83	DE-A,C      3230877 US-A-    4452004	06/10/83 05/06/84
DE-C- 536590		None	

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